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Bittnerilia, new genus for *Lambrus eocaenus* Bittner, 1883 (Decapoda, Brachyura, Calappidae) from the middle Eocene of Veneto (N Italy)

Abstract – *Lambrus eocaenus* Bittner, 1883 (Decapoda, Brachyura), from the middle Eocene of San Giovanni Ilarione (Verona), was described on morphological characters of the type specimen, which was incomplete in the orbito-frontal part. A well-preserved new carapace with ventral parts and right cheliped I, discovered in the coeval levels of Chiampo Valley (Vicenza), is here described. New morphological characters make it possible to give a new description of *Lambrus eocaenus* Bittner, 1883, suggesting the assignment of this species to a new taxon within the family Calappidae H. Milne Edwards, 1837. *Bittnerilia* n. gen. shows a subpentagonal carapace with anterolateral margins provided with narrow fissures and wide and tuberculate posterolateral margins; subtriangular front, strongly convex downwards; rounded orbits; granulate and rounded supraorbital margin; dorsal regions strongly convex and with many granulations; wide pterygostomial region with a deep and wide subbranchial groove; chela of cheliped I with granulate ridge on upper margin. *Bittnerilia* n. gen. shows some relationships also with the families Parthenopidae MacLeay, 1838, Hepatidae Stimpson, 1871, and Aethridae Dana, 1851. The convex shape of the front is a primitive character.

Key words: Crustacea, Decapoda, Calappidae, Eocene, N Italy.

Riassunto – *Bittnerilia*, nuovo genere per *Lambrus eocaenus* Bittner, 1883 (Decapoda, Brachyura, Calappidae) dell'Eocene medio del Veneto (Italia settentrionale).

Lambrus eocaenus Bittner, 1883 (Decapoda, Brachyura) è stato istituito sulle caratteristiche morfologiche del tipo, incompleto della parte orbito-frontale, proveniente dall'Eocene medio di San Giovanni Ilarione (Verona). Viene ora analizzato un nuovo carapace ben conservato e provvisto delle pareti ventrali e del chelipede I, proveniente dai livelli coevi della Valle del Chiampo (Vicenza). Le caratteristiche emerse ci hanno consigliato di approfondire la descrizione morfologica di *Lambrus eocaenus* Bittner, 1883 per il quale si propone la collocazione in un nuovo taxon della famiglia Calappidae H. Milne Edwards, 1837. *Bittnerilia* n. gen. è caratterizzato da un carapace subpentagonale, provvisto di margini antero-laterali con strette fessure e margini postero-laterali espansi e tubercolati; fronte subtriangolare, fortemente convessa verso il basso; orbite arrotondate; margine soprarorbitale bombato e granulato; regioni dorsali molto convesse e ornate da abbondanti granulazioni; regioni pterigostomiali ampie e provviste di un profondo e ampio solco subbranchiale; chela del chelipede I con cresta granulata nel margine superiore. *Bittnerilia* n. gen. mostra anche affinità morfologiche con le famiglie Parthenopidae MacLeay, 1838, Hepatidae Stimpson, 1871 e Aethridae Dana, 1851. La forma convessa della fronte è da ritenersi primitiva.

Parole chiave: Crustacea, Decapoda, Calappidae, Eocene, Italia settentrionale.

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Introduction

The rich faunal assemblages of decapod crustaceans, mainly brachyurans, discovered in the Tertiary levels of Veneto (N Italy), make it possible to expand the knowledge of the systematic and phylogenetic aspects of this group of animals. Recently, De Angeli & Beschin (2001) published a systematic catalogue of the species known to date of Cirripedia, Isopoda, Decapoda and Stomatopoda of Vicenza Province.

Among the decapods, the family Parthenopidae MacLeay, 1838, is represented with two species *Parthenope nummulitica* (Bittner, 1875), and *P. eocaena* (Bittner, 1883), from the middle Eocene of San Giovanni Ilarione (Verona) and Chiampo Valley (Vicenza).

Parthenope eocaena was described by Bittner (1883) on the characters of the type, discovered in the volcanic marls from the middle Eocene of Ciupio of San Giovanni Ilarione (Verona). Other reports of this species are from the middle Eocene of "Main" and "Boschetto" quarries of Arzignano (Vicenza) and Nogarole Vicentino (Vicenza) respectively (Busulini *et al.*, 1983; Beschin *et al.* 1994).

The study of a new specimen with the carapace well preserved and including the ventral parts and right cheliped I, discovered in the coeval levels of Chiampo Valley, permits expansion of the morphological description of this species, suggesting its placement in a new taxon within the family Calappidae H. Milne Edwards, 1837.

Material

The study specimen was discovered in "Albanello" quarry of Nogarole Vicentino, located on the S side of Chiampo Valley (Fig. 1). This area has been the subject of many geo-palaeontological studies (Munier Chalmas, 1891; Fabiani, 1915; Hottinger, 1960; Schaub, 1962; Piccoli, 1962; De Zanche, 1965; Barbieri & Zampieri, 1992; Beschin *et al.*, 1994; Beccaro *et al.*, 2001). The stratigraphic sequence is represented by Scaglia rossa from the Upper Cretaceous, followed by Eocene nummulitic limestone intercalated with volcanic materials that are sometimes fossiliferous. Many molluscs and corals, displayed in Museo "P. Aurelio Menin" of Chiampo and illustrated by Mellini & Quaggiotto (1988), have been discovered in the volcanic marls from the middle Eocene of "Albanello" quarry of Nogarole Vicentino. Many decapod crustaceans were also discovered in this quarry; *Justitia vicetina* Beschin, De Angeli & Garassino, 2001, *Italialbunea lutetiana* (Beschin & De Angeli, 1984), *Mithracia margaritifera* Beschin, Busulini, De Angeli, Tessier, 1994, *Stevea cesarii* Beschin, Busulini, De Angeli & Tessier, 1994, *Eopalicus squamosus* Beschin, Busulini, De Angeli & Tessier, 1996, *Retropluma eocenica* Via, 1959, *Retrocypoda almelai* Via, 1959, *Hepatiscus pulchellus* Bittner, 1875, and *Hepatiscus neumayri* Bittner, 1875 (Beschin *et al.*, 1994, 1996a, 1996b, 2001; De Angeli, 1998, 2000; De Angeli & Beschin, 1999).

The study specimen comes from the same layers where the other decapod crustaceans were discovered. The matrix was removed from the carapace to observe the ventral surface and the cheliped I. The specimen is housed in Museo Civico "G. Zannato" of Montecchio Maggiore (Vicenza). The systematic palaeontology used in this paper follows the recent classification proposed by Martin & Davis (2001).

Acronym: MCZ, Museo Civico Zannato.

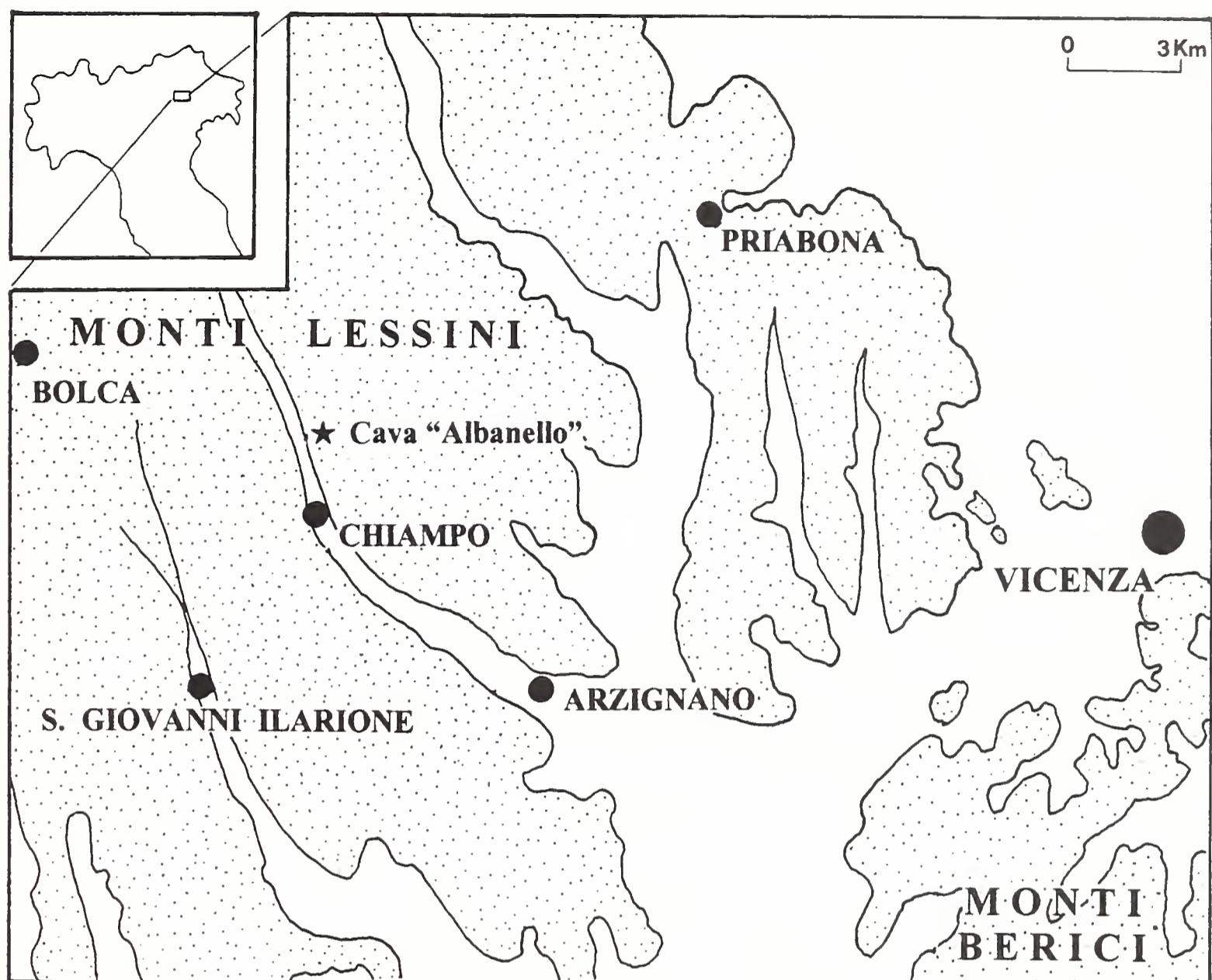


Fig. 1 – Geographical location of “Albanello” quarry of Nogarole Vicentino (Vicenza).
Fig. 1 – Ubicazione geografica di cava “Albanello” di Nogarole Vicentino (Vicenza).

Systematic Palaeontology

Order Decapoda Latreille, 1802
 Infraorder Brachyura Latreille, 1802
 Subsection Heterotremata Guinot, 1977
 Superfamily Calappoidea H. Milne Edwards, 1837
 Family Calappidae H. Milne Edwards, 1837

Genus *Bittnerilia* nov.

Diagnosis: carapace convex, subpentagonal, as long as wide, with maximum width in the median part; subtriangular front, convex downwards; subcircular orbits; raised and granulate supraorbital margin; curved and notched anterolateral margins, with three narrow fissures; posterolateral margins wide in lateralposterior sense, with granulate protuberance; axial regions narrow, slightly differentiated and marked with two longitudinal grooves; raised regions with irregular tubercles; wide and elevated epibranchial regions; well developed pterygostomial regions with very wide subbranchial groove; subsquare oral cavity; narrow sternum with subtriangular sternites I-II; sternite III with sharp lateral protuberance; abdominal cavity of the sternum deep and expanded on segment III; subtriangular chela with

cristate upper margin; short and strong fixed finger; long dactylus with nodosity on the outer margin.

Type species: Lambrus eocaenus Bittner, 1883.

Etymology: the trivial name alludes to Alexander Bittner (Friedland, 1850 – Wien, 1902) who described the type of this species and *Calappilia* A. Milne Edwards, 1873, the genus that shows most morphological affinities with the study specimen.

Description: as for the type species.

Discussion. Bittner (1883) described *Lambrus eocaenus* on the morphological characters of the type, incomplete in the anterior part of carapace. The specimen was discovered in Ciupio of San Giovanni Ilarione (Verona). The author included this species among the Parthenopidae MacLeay, 1838, on the basis of strongly raised and granulated branchial regions. The particular shape of posterolateral margins and the lack of morphological details of the anterior part of carapace suggested the ascription of this species to *Parthenope* Weber, 1795 (= *Lambrus* Leach, 1815). The study of the new specimen with a complete carapace and well preserved ventral parts and cheliped I has expanded the morphological characters of this species.

Bittnerilia n. gen. exhibits strongly raised branchial regions, subcircular orbits, and raised and granulate supraorbital margins, very similar to characters of some Parthenopidae Mac Leay, 1838, above all *Pseudolambrus* Paulson, 1875. However, *Pseudolambrus* Paulson, 1875, has a subtriangular carapace and a different shape of the front. The narrow fissures in the anterolateral margins are similar to characters of the Hepatidae Stimpson, 1871, and Aethridae Dana, 1851, in particular *Osachila* Stimpson, 1871, and *Aethra* Leach, 1816 respectively. The subtriangular shape of the front, strongly convex downwards, is a primitive character.

However, the study specimen has some characters typical of Calappidae H. Milne Edwards, 1837, in particular *Calappilia* A. Milne Edwards, 1873, and *Calappa* Weber, 1795. In fact, the shape of carapace with convex anterolateral margins, developed in the median part, the presence of wide and granulate posterolateral margins, followed ventrally by a sharp and deep subbranchial groove, the subtriangular shape of the chela with a granulate ridge on the upper margin and the presence of nodosity on the outer margin of dactylus are similarities. Even though the sternum is incomplete, it is completely different with respect to that of Parthenopidae MacLeay, 1838, and Aethridae Dana, 1851 (Guinot, 1967 – figs. 28-31). This shape of sternum shows more affinities with the Calappidae A. Milne Edwards, 1837. The subsquare shape of the oral cavity that is more elongate in the anterior part, and the strong convexity of the front are characters difficult to compare with those present in the fossil species known to date.

Even though the correlation among Aethridae (“Parthenoxystomata” by Guinot), Calappidae, and Parthenopidae are not clear (Guinot, 1966, 1967), the morphological characters observed in the study specimen warrant a new taxon for this species, included among the Calappidae A. Milne Edwards, 1837.

The family Calappidae A. Milne Edwards, 1837 was recently discussed by Schweitzer & Feldmann (2000) who ascribed to this family five fossil genera (*Calappilia* A. Milne Edwards, 1873, *Camarocarcinus* Holland & Cvancara, 1958, *Mursilia* Rathbun, 1919, *Mursiopsis* Ristori, 1889, and *Stenodromia* A. Milne Edwards, 1873), four fossil and living genera (*Calappa* Weber, 1795, *Acanthocarpus* Stimpson, 1871, *Cycloes* de Haan, 1837, and *Mursia* Leach in Desmarest,

1823) and four living genera (*Calappula* Galil, 1997, *Cyclozodion* Williams & Child, 1988, *Paracyclois* Miers, 1886, and *Platymera* H. Milne Edwards, 1837).

Even though *Bittnerilia* n. gen. has some morphological characters of carapace and chela in common with *Calappa* Weber, 1795, and *Calappilia* A. Milne Edwards, 1873, it differs from these and other genera of the family in possessing the subtriangular front that is strongly convex downwards, a rostrum raised ventrally between the antennular areas, the rounded orbits, closely spaced and with a raised and granulate supraorbital margin, and the strongly raised epibranchial regions.

Bittnerilia eocaena (Bittner, 1883)

Figs. 2-4

1883 – *Lambrus eocaenus* – Bittner, p. 309, t. 1, ff. 7a-c

1910 – *Lambrus eocaenus* – Fabiani, p. 28

1983 – *Parthenope eocaena* – Busulini et al., p. 62, t. 2, ff. 3a-b

1994 – *Parthenope eocaena* – Beschin et al., p. 181, t. 6, ff. 1a-b

2001 – *Parthenope eocaena* – De Angeli & Beschin, p. 27

Holotype: specimen described and illustrated by Bittner (1883).

Diagnosis: as for the genus.

Occurrence and measurements: one specimen (MCZ 2387) from the middle Eocene of “Albanello” quarry of Nogarole Vicentino (Vicenza).

Maximum width of carapace: 28.3 mm

Maximum length of carapace: 26.6 mm

Fronto-orbital width: 14.6 mm

Frontal width: 7.8 mm

Propodus length (with fixed finger): 19.2 mm

Propodus length (except fixed finger): 12.6 mm

Propodus height: 13.5 mm

Propodus thickness: 7.2 mm

Description. Dorsally convex subpentagonal carapace, as long as wide, with maximum width in the median part. Fronto-orbital margin long, half of width of carapace. Subtriangular front, rounded distally and strongly convex downwards. Subcircular orbits. Raised supraorbital margin marked by two narrow fissures. Long strongly raised granulate preorbital tooth, marked by a deep posterior groove. Short supraorbital tooth with dorsal protuberance extending backwards. Extraorbital tooth rounded externally. Infraorbital margin concave with a narrow fissure below the extraorbital tooth. Infraorbital area with clear porosity. Anterolateral margins convex and indented, marked by three narrow fissures. Posterolateral margins longer than previous, expanded posterior-laterally and with granulate protuberance. Posterior margin as long as front, convex and with a weak granulated ridge. Regions of carapace marked by two smooth longitudinal grooves extending the total length of carapace converging in the urogastric region. Axial regions slightly differentiated. Frontal region convex downwards and marked by a deep median longitudinal depression. Epigastric regions formed by a granulated process extending posteriorly. Protogastric regions relatively wide, strongly raised, and with large tubercles. Mesogastric and metagastric regions with a median protuberance formed by an ensemble of tubercles and with a more raised and sharp

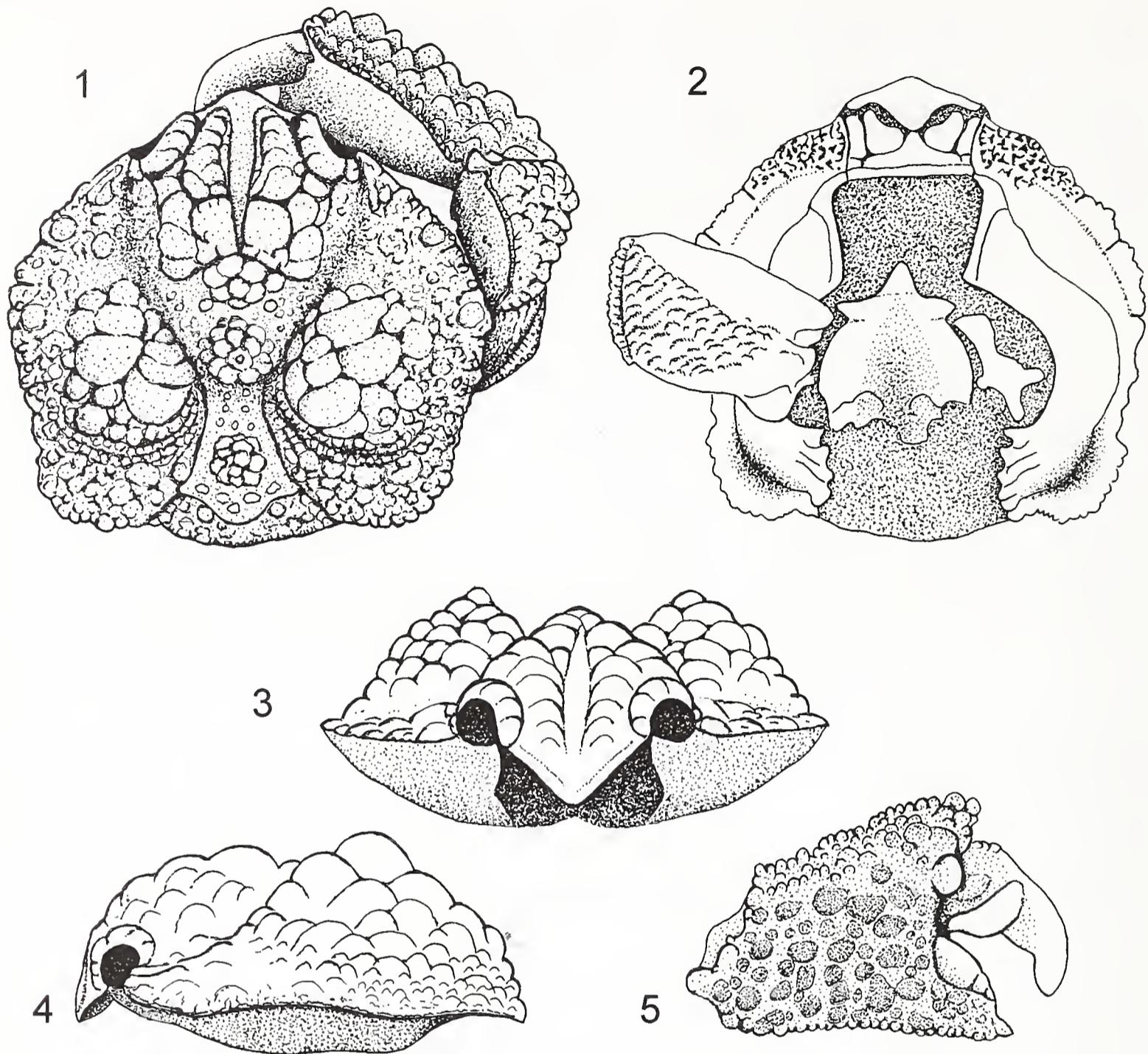


Fig. 2 – *Bittnerilia eocaena* (Bittner, 1883), carapace reconstruction. 1) dorsal view; 2) ventral view; 3) frontal view; 4) lateral view; 5) shape of chela.

Fig. 2 – *Bittnerilia eocaena* (Bittner, 1883), ricostruzione del carapace. 1) norma dorsale; 2) norma ventrale; 3) norma frontale; 4) norma laterale; 5) forma della chela.

median tubercle. Urogastric region narrow and depressed. Subhexagonal cardiac region well marked by branchiocardiac grooves, wider posteriorly with an anterior protuberance formed by an ensemble of tubercles and two sharp marginal median processes. Posteriorly this region becomes narrower, marked by a convex groove. Intestinal region depressed and with granulations aligned transversely. Subtriangular hepatic regions, lowered and with three tubercles. Branchial regions wide and raised. Epibranchial regions with large rounded tubercles. A curved depression, relatively engraved, with small nodosity is located transversely on branchial regions, marking anteriorly posterior branchial regions. Posterior branchial regions with many tubercles becoming narrower posteriorly. Pterygostomial regions wide and slightly granulate. Subhepatic regions with a weak depression along the margins. The three fissures of the anterolateral margins are clearly visible in ventral view: the two anterior ones are deeper than the third. In ventral view, the median part of the rostrum extends toward the epistome. Antennular areas wide. Antennular basis developed transversally. Epistome moderately long and relatively narrow

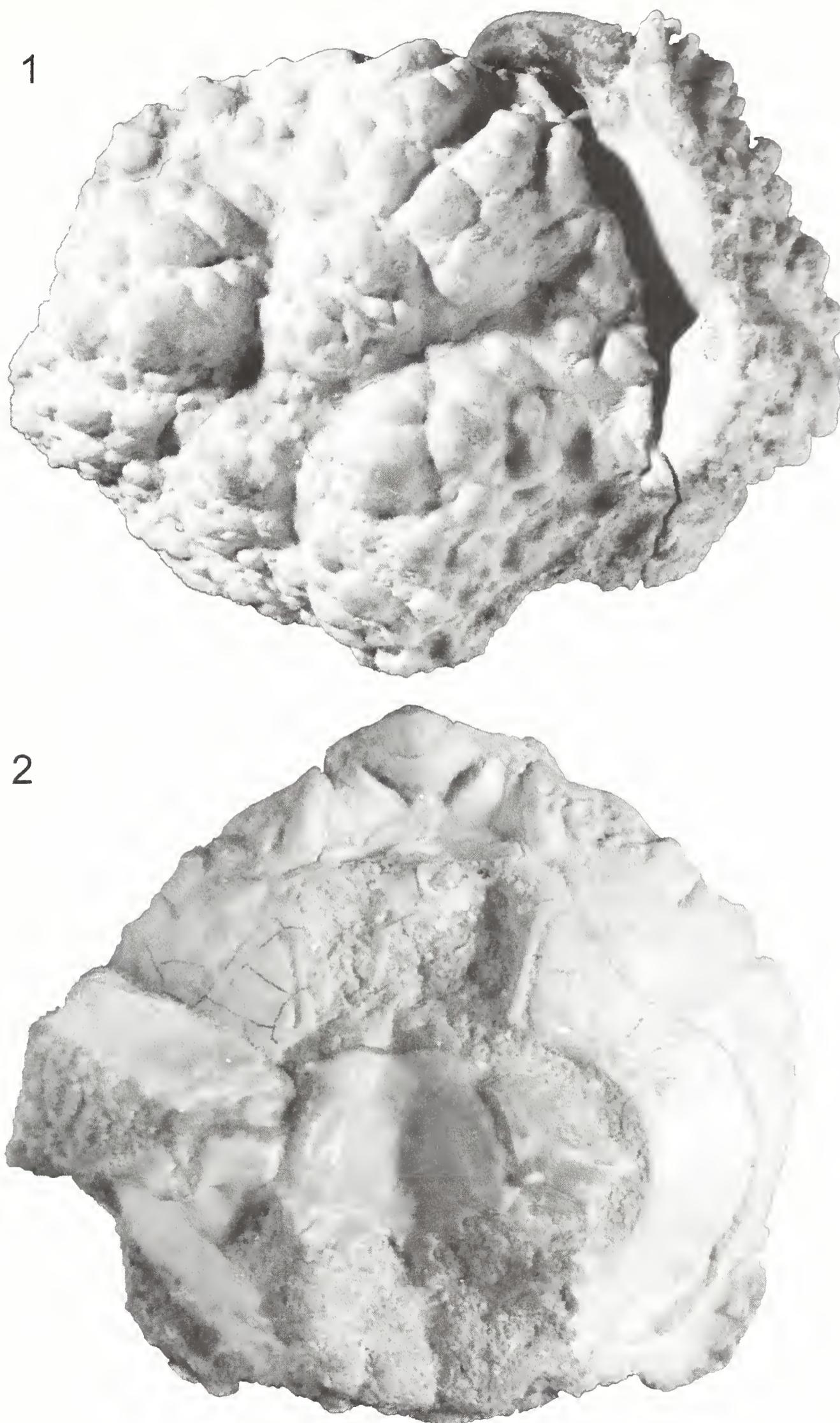


Fig. 3 – *Bittnerilia eocaena* (Bittner, 1883), n. cat. MCZ 2387. 1) dorsal view (x 2.8); 2) ventral view (x 3.5).

Fig. 3 – *Bittnerilia eocaena* (Bittner, 1883), n. cat. MCZ 2387. 1) norma dorsale (x 2,8); 2) norma ventrale (x 3,5).

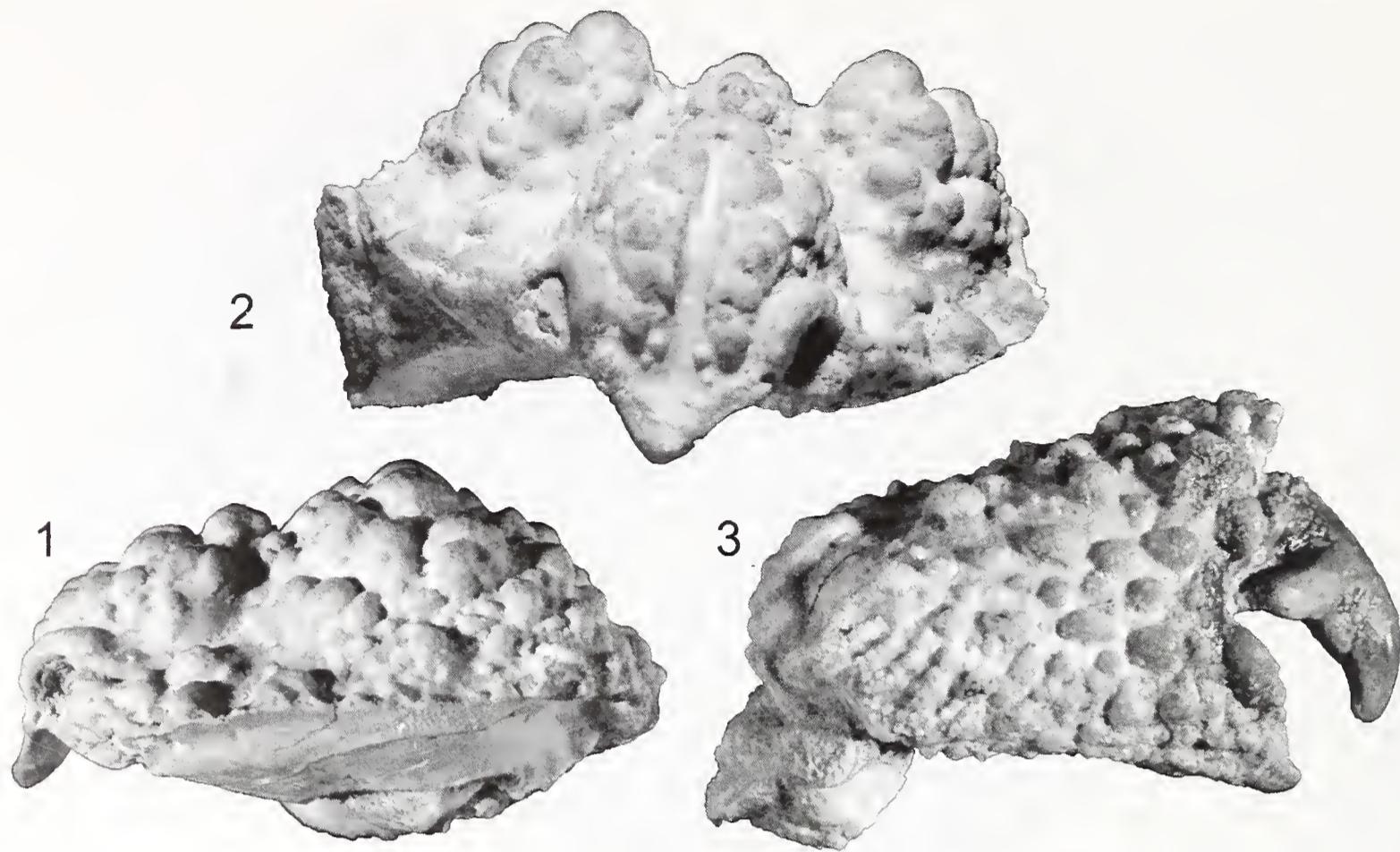


Fig. 4 – *Bittnerilia eocaena* (Bittner, 1883), n. cat. MCZ 2387. 1) lateral view (x 2.3); 2) frontal view (x 2.3); 3) right cheliped I (x 2.3).

Fig. 4 – *Bittnerilia eocaena* (Bittner, 1883), n. cat. MCZ 2387. 1) norma laterale (x 2,3); 2) norma frontale (x 2,3); 3) chelipede destro (x 2,3).

in the anterior part. Antennal basis narrow and elongate longitudinally. Antennal fissure narrow. Subsquare oral cavity, enlarged anteriorly. Anterior part of sternum is preserved: subtriangular sternites I-II narrow with rounded apex; sternite III with a sharp process along the margins; sternite IV relatively enlarged and strongly lowered in the median part; a transverse groove is present between the sternites IV-V, interrupted in the median part. Right cheliped I with subcylindrical merus having smooth inner margin and outer margin with small granulations placed in oblique rows. Outer proximal part of merus with a laminar ridge developed transversely. Short subtriangular carpus with sharp-edged upper margin and outer margin with tubercles. Subtriangular propodus, higher than long, with cristate upper margin. Inner part of the propodus flat and smooth, outer part convex with many tubercles bearing small granulations. Short fixed finger with upper margin placed obliquely, having a wide tooth weakly developed. Dactylus longer than fixed finger, with curved apex and with small granulations and a large, oblique protuberance in the outer anterior part.

Discussion. The study specimen shows morphological characters observable on the type described by Bittner (1883), such as the strong convexity with many granulations of the dorsal margins and the granulate transverse depression on branchial regions. Also similar are the pterygostomial regions and the oral cavity, on the basis of observing Bittner's illustrations. However, Bittner's illustrations do not show the granulate protuberances of the frontal part and orbits of the carapace. Since these protuberances, well developed in the study specimen, have a thin profile and would be easily detached, we suppose that the posterolateral margins of the type were incomplete.

Conclusion

The ascription of this species to a new taxon is justified by some morphological characters: subpentagonal shape of carapace, the presence of granulate protuberances of the posterolateral margins, the deep and wide subbranchial groove, the shape of the sternum and cheliped I.

However, the study of the new specimen pointed out some morphological characters in common with other families, such as Parthenopidae Mac Leay, 1838, Hepatidae Stimpson, 1871, and Aethridae Dana, 1851. The shape of the strongly convex downwards front is very strange and surely is a primitive character, suggesting that *Bittnerilia* nov. gen. could be ascribed to a new subfamily or family. New specimens with well preserved sternum and male abdomen would allow a more certain ascription.

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